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Farming in Tsetse Controlled Areas

FITCA

FARMING IN TSETSE CONTROLLED AREAS
FITCA

Environmental Monitoring and Management Component

E M M C

Project Number : 7.ACP.RP.R. 578

FITCA-EMMC workshops on information exchange and training with rural communities on environment: Eastern Uganda. Report and recommendations.

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CIRAD

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OVERVIEW: FITCA Project

The regional project FITCA (Farming in Tsetse Controlled Areas) has a general objective to integrate tsetse control activities into the farming practices of rural communities such that the problem of trypanosomosis can be contained to the levels that are not harmful to both human and the livestock and environmentally gentle and integrated into the dynamics of rural development and are progressively handled by the farmers themselves. The project is hosted by the Inter-African Bureau for Animal Resources of the African Union (AU-IBAR) and covers areas with small scale farming in Uganda, Kenya, Tanzania and Ethiopia.

EMMC (Environmental Monitoring and Management Component) is the environmental component of FITCA. It is implemented by ILRI in collaboration with CIRAD (as member of SEMG, Scientific Environmental Monitoring Group). This regional component has been charged with the responsibility of identifying of monitoring indicators and methodologies, as well as the development of an environmental awareness among the stakeholders. It contributes to propositions of good practices and activities mitigating the impacts and rehabilitating the threatened resources likely to result directly or indirectly of tsetse control and rural development.

The FITCA EMMC project was written by Dr. Robin Reid of the International Livestock Research Institute (ILRI) a future Harvest Centre supported by CGIAR (Consultative Group for International Agricultural Research).

The present report has been prepared under the responsibility of the leading group of EMMC:

- Dr Bernard Toutain, agronomist, coordinator
- Dr Joseph Maitima, ecologist

EXECUTIVE SUMMARY

Four workshops were held in four sub counties in the districts of Soroti, Tororo, Iganga and Kamuli. Five to seven villages were involved in each sub county. Participatory approach was used to gather the farmers' perception on four environmental themes; Forests and woodlands, wetlands and water, land and soils and livestock and wildlife. The main issues that have caused changes in each theme were: deforestation; cultivation of wetlands and drying up of swamps; land degradation and low productivity; livestock diseases and habitat destruction.

The communities related the changes to their effects on human livelihood and incidences of sleeping sickness and Nagana. Majority of these changes have had negative impacts on livelihood, thus making the communities poorer than before. Loss of habitat due to over exploitation of forests and cultivation of wetlands have affected tsetse ecology and resulted in sleeping sickness and Nagana.

The activities being undertaken by FITCA in reclaiming tsetse infested areas and making them available for agricultural activities are short term benefits whereas land degradation and the resultant cycle of poverty are the long term outcomes, unless steps are taken now to address the expected land use changes and the land carrying capacity. In this regard the initiative to encourage zero grazing and pasture development may help to address the problem of land degradation.

The communities developed a suite of recommendations and indicators for each theme. It is important that follow up meetings be done to see the development of action plans at village level to implement these recommendations in order to arrest the downward spiral of the environment. Involvement of communities in monitoring, management and conservation is important in order to have a sustained conservation effort, as these communities are the ones bearing the full impacts of the changes that have taken place in the environment.

ACKNOWLEDGEMENTS

I wish to extend my sincere gratitude to my team who assisted in facilitating the workshops in all the four sites namely: Bernard Toutain, Joseph Maitima, Julia Karuga and Anna Rutebuka. The work would not have been completed without the able assistance from a team of interpreters who made it easy for us to understand the discussions carried out in Ateso, Japandola and Lusoga.

I wish also to thank the District Entomologists, who are FITCA focal point persons in the four districts namely: Kabale, Fred; Obwai, Henry; Aside, Ann and Olika, who mobilized the participants in their respective districts, and the Districts Environmental Officers in Tororo and Kamuli for sparing their time to enlighten the participants on the role of the government on issues of environment.

I wish to thank the communities of Kateta, Kyere, Iloywa, Bulamagi; Namwendwa and Bukooma Sub Counties who participated in these discussions, for giving us their time and knowledge. It is my sincere hope they learnt as much as we did during those days we spent together. My thanks to the Sub County officers who were on hand to meet us and made sure the workshops went on unhindered and were a success that they turned out to be.

Lastly, I am grateful to FITCA-EMMC for availing the funds to undertake this study.

INTRODUCTION

Since time immemorial, the environment has been woven into the lives of African people. Traditional and cultural values among varied and disparate communities have governed the way in which people interact with the environment and the way in which natural resources are used and managed.

Africa has rich and varied biological resources, forming the natural wealth on which social and economic systems are based. These have global importance. A variety of these resources are used for food, construction of houses, carts, and boats, household utensils, clothing and raw materials for manufactured goods. Many species with medicinal properties are harvested by local communities and pharmaceutical companies alike.

The failure to utilize the indigenous knowledge for natural resource management and conservation has hampered efforts to conserve this rich resource base. Local communities ascribe great value to forest and wildlife resources and understand that in addition to being sources of food, these resources can provide ecosystem service (Olsen et al 1999). Understanding and implementing the indigenous knowledge systems can help to bring the knowledge holders into projects. This new partnership would apply such knowledge in environmental assessment and project implementation.

Natural habitats in Eastern Africa are under threat from a rapidly increasing population and accompanying demands for space, agricultural produce and economic gains from commercial and industrial exploitation (UNEP, 2002).The major threats are habitat and species loss.

Forests and woodlands play a critical role in the survival of human population. They provide directly shelter and food for the people and their livestock, water, medicinal plants, building materials and fuel. Forests and woodlands regulate environment by slowing soil erosion, controlling run- off rain water. They sustain cultural religious and spiritual values of the society. Loss of forests and woodlands means total loss of a vital resource and disruption of the social economic activities they support (UNEP, 2002)

Africa share of global freshwater resources is about 9% (Shiklomanov, 1999). This resource is unevenly distributed. Availability and quality are important factors that affect management and conservation of fresh water resources since the population growth rate is higher than the development and supply of this vital commodity.

Africa has abundant natural terrestrial resources and potential for economic, social and environmental development. The peoples of Africa are rural practicing small scale cultivation or pastoralism. The major challenges facing land in Africa are; pressures to increase production, land degradation and reduced productivity, desertification and land reform policies regarding tenure and land rights. Soil management practices and afforestastion programmes are long term measures needed to conserve land and soil resources (FAO/AGL 2000).

Study Sites

The workshops were held in four districts of eastern Uganda, Soroti, Tororo, Iganga and Kamuli. Five to seven villages in one Sub County in each district were invited to attend a two day participatory workshop on environment. The selection of the sub counties and the villages which took part in the workshop was based on certain criterion: -

1). they were categorized as being in the high risk level one or two areas in regard to sleeping sickness and Nagana (see figure 1),

2). FITCA Uganda was involved in the villages with some activities such as pasture development, provision of ploughs, oxen and zero grazing programmes, These activities are expected to have some impact on the environment.

3). FITCA – EMMC had carried out vegetation and resource mapping and social economic studies in the villages,

4). the villages were participating in an IDRC funded project on "Links between sleeping sickness and natural resource endowment and Use. What can communities do?" These villages have for the last three years been involved in community participation in sleeping sickness control. Understanding how the environment could affect tsetse control would be of assistance to their control efforts.

5). some of the villages invited did not qualify on any of the above criteria but were neighbors to some of the qualifying villages.

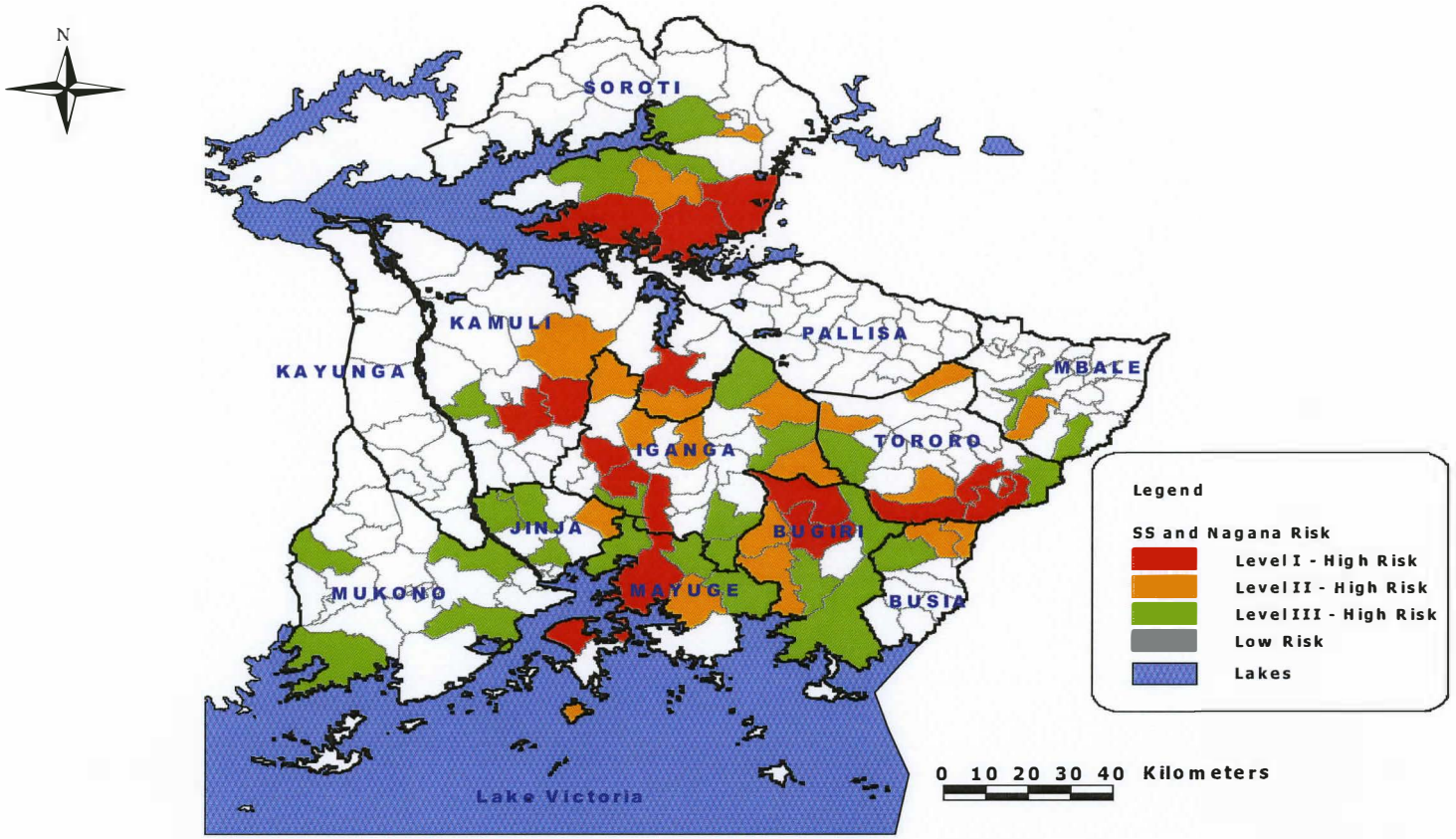

Figure 1 FITCA (Uganda) priority areas by sleeping Sickness and Nagana risk
(Source FITCA Uganda Project)

From the above criteria, Kateta Sub County in Soroti, Iloywa in Tororo, Bulamagi in Iganga and Namwendwa in Kamuli were selected. The following villages from each sub county were invited to participate in the workshop.

Kateta Sub County, Soroti – Akoroi A, Akoroi B, Alilimo, Okodo and Nananga B. Alilimo village hails from Kyere Sub County but since it neighbors Kateta and participated in the IDRC funded project it was included in this workshop.

Iloywa Sub County, Tororo – Nambogo, Papada, Mella- Pajabbo, Kugeyi and Segere.

Bulamagi Sub County, Iganga – Bubaka, Bulowoza, Bwanalira and Mawagala

Namwendwa Sub County, Kamuli – Butaaga, Bukwanga, Bukose-Bunyirwa, Katono, Butoogo, Buyuba-Busisri, Buluya-Bugovi and Bugemye, Bukooma village in Iganga participates in the IDRC project and since Namwendwa is nearer to Bukooma than Bulamagi, they were invited to attend the workshop at Namwendwa.

The composition of the participants from each village was: - at least 6 women, LC1, LC2, Youth representative and the rest were men.

Objectives of the workshop

The workshops were held to: - a) engage the communities in a participatory way in discussions pertaining to environmental issues; b) solicit the communities' perception and understanding on the issues of environment; c) make recommendations on how to address the changes and d) gather consensus between the government, scientists and the communities' on how to address the issues in question.
The themes discussed were forests, woodlands and vegetation; wetlands and water; land and soils and livestock and wildlife.

Process

The meetings were held at the village in case of Akoroi A in Soroti, or at the respective Sub County headquarters for the other three districts. The programme for the workshop involved two lecturers to set the mood for the workshop and a plenary session to build consensus on the environmental issues from the lectures (Appendix 2 & 3).

The participants were divided into four groups taking into consideration the village's representation in each group and gender distribution, in order to have a balanced output from each group. Each group was given a theme to discuss, with the help of a facilitator and an interpreter as the discussions were held in their local languages (Ateso, Japandola and Lusoga). The themes for discussion were woodlands and vegetation, wetlands and water, land and soils and livestock and wildlife. A check list of questions was used to guide the discussions (see Appendix 3).

After a discussion lasting about 5 hours, each group presented in a plenary session their outputs for other participants to critique and develop consensus on the recommendations.

Government's position on Environment

District Environmental Officers in each district were invited to give a lecture on environmental issues affecting the district and the government's position on environment. Only two from Tororo and Kamuli districts did avail themselves for the workshops The environment officers emphasized the role of communities in environmental protection and also reviewed the relevant government articles that relate to harvesting of goods, services and protection of the environment. Of importance were: -

1). provisions of the constitution on environment, objective XXVII which, outlines the role played by the central government on environment

2). article 245, which provides measures of protecting environment from abuse, pollution and degradation and promotes sustainable use and awareness.

3). Article 237 (2), this stipulates the role of the local government in protecting and holding in trust any lands and natural resources for common good.

4). the National Environment Statutes of 1995, whose main objective is to integrate environmental requirements into planning and production process and ensuring renewable resources are optimally used.

5). Article 39 of the constitution, which makes it a constitutional right for every Ugandan to have a healthy environment.

Scientists' understanding of environment

These lectures were designed to bring out the scientist's view of the environment in an effort to show to the communities its importance. The lectures outlined definition and the scales of the environment (local, regional, global), Why FITCA is interested in the environment, the demands on the environment at individual, local and global scales and the interdependence of the various components of the environment. Not all components of an ecosystem are beneficial from the human point of view but all are important to each other. The example of the bee which makes sweet honey, pollinates fruit trees was given but the bee also has a painful sting. If one eliminates the bee because of its painful sting, then most likely he will have to do without fruits whose pollination is dependent on bees visiting the trees. The lecture also brought out the goods and services provided by various environmental components. At the end it was clear that the environment is fragile and needs to be protected and harvested in a sustainable manner because the human survival and existence is dependent on it.

FORESTS, WOODLANDS AND VEGETATION

Forests, woodlands and vegetation in general are remarkable ecosystems or part of ecosystems that have played a critical role in the survival of human populations. They have high productivity rates of more than 80gC/m ^{2} /yr and support rich and diverse animal and plant communities that together provide resources and opportunities, sustaining livelihoods and commercial operations (WCMC, 2000).

Definition

The communities defined the vegetation as any thing that grows on the soil and examples of which are grasses, shrubs and trees. Forests and woodlands were defined as a concentration of same or different types of trees ranging from a quarter of an acre in size.

Goods and services provided by forests, woodlands and vegetation

All the four communities have similar perception of goods and services provided by forests, woodlands and vegetation (Table 1). However, as the human population increases, forests, vegetation cover and wildlife numbers decreases as one move from Soroti in the east to Kamuli and Iganga in central Uganda as a result of habitat loss. Accordingly, the role of forests and woodlands as a source of bushmeat decreases. It is evident that they view the forests, woodlands and vegetation as an important natural resource for their livelihoods.

Table1: The perception of goods and services provided by Forests, woodlands and vegetation by four communities in Eastern, Uganda

	Soroti	Tororo	Iganga	Kamuli
Goods and products	1.Medicinal herbs and roots 2.Timber 3.Firewood and charcoal 4.Grass for thatching 5.Wildlife (bushmeat) 6.Fruits and honey	1.Building poles, 2.Fire wood and charcoal, 3. Reeds for basket making and thatching 4. Medicinal plants, 5. Food (yams, fruits), 6.Wildlife(bushmeat)	1.Medicinal herbs, 2. Timber for building and poles, 3. Charcoal and firewood 4. Fiber for thatching and, bedding mats, 5.Materials for drum making 7. Cooking oil and 8.Paper	1.Firewood and charcoal 2.Timber 3.Medicinal herbs 4. Grass for thatching 5. Fiber for baskets 6. Food (yams and fruits)
Services	1.Acts as wind breakers 2. Tourism 3. Shade 4. Provides fresh air 5. Has a role in hydrological cycles 6. Hiding place in dangerous times 7. Acts as toilets where none exists 8. Habitat for wildlife	1.Provides fresh air 2. Has a role in hydrological cycles 3.Acts as wind breakers 4.Enhances soil fertility 5. Controls soil erosion 6. Acts as water catchments. 7. Habitat for wildlife	1. Shade and shelter 2. Habitat for wildlife 3. Wind breakers 4. Source of income 5. Has a role in hydrological cycles 6.Habitat for wildlife therefore tourist attraction	1.Has a role in hydrological cycles 2. Habitat for wildlife 3. Acts as wind breakers 4. Provides shelter 5. Protects soil from erosion 6. Provides pasture

Changes that have occurred in forests, woodlands and vegetation in the last 30 years

The major change has been loss of forest ,woodland and vegetation cover leading to a cascade of losses of the major goods, products and services that are naturally harvested and or emanate from forests, woodlands and vegetation, which include: - rainfall which has decreased in amounts and has become erratic and unreliable due to deforestation; loss of medicinal plants and herbs, building materials (grass for thatching, poles and timber) have become more expensive; reduction in soil fertility due to reduction in vegetation and forest cover leading to soil erosion and poor yields; new plant species have emerged which have become good habitat for tsetse fly (*Lantana camara*), and others have been introduced which are multipurpose (Neem *Azardamatea indica* and Moringa); wild animals like monkeys have moved to near homes causing destruction of crops and

killing poultry after loss of their natural habitat; wildlife numbers have decreased resulting in scarcity of bushmeat; weeds have increased causing farmers to weed many times in order to have any meaningful harvest; firewood has become scarce forcing women to walk further in search of the commodity neglecting other domestic chores and sometimes this has become the cause of household conflicts; streams have dried due to loss of forests in the catchment areas; destruction of habitat has forced tsetse to migrate to bushes near homesteads resulting in sleeping sickness even in young children; equally loss of wildlife due to loss of habitat has caused tsetse to change their natural hosts from wildlife to humans and livestock; security has improved for rebels and thieves have no place to hide because of reduced forest and vegetation cover; more land has been availed for cultivation.

The only positive changes that have occurred are introduction of fast maturing trees like Neem, Moringa which have medicinal value and loss of hiding places used by thieves and rebels thus improving on security. This was more pronounced in Tororo and Soroti areas. Soroti at the time was experiencing a lot of insecurity due to insurgency by Lord's Resistance Army (LRA) a rebel group trying to overthrow the government.

The cause of changes observed

Table 2: Causes of deforestation.

Observed Change	Causes
1. Deforestation	1. Population pressure on land 2. Expansion of cultivated land 3. Increased demands for forest products (timber, charcoal, medicinal herbs) causing their over exploitation 4. Ignorance of the consequences 5. Urbanization creating demands for wood fuel 6. Wars causing burning of vegetation cover 7. Poverty causing over dependence on forests resources

Indigenous knowledge used long ago to mitigate the impacts

In many African societies indigenous knowledge systems existed which promoted human nature linkages and helped communities to adapt to the changing environment. These were discouraged during the colonial period. Such knowledge systems have a lot to offer in natural resource management (Matowanyika, 1999). In Eastern Uganda, the communities had developed their own knowledge system base to control actions that might lead to environmental degradation. These included: -

1. Taboos existed which restricted indiscriminate cutting down of trees.
2. Children were not allowed to cut down some particular trees like "esimatu". If they did it was believed they would fall sick.
3. When a witchdoctor died a tree was planted on his grave and could never be cut.
4. Bush burning was restricted to dry season only. Today people burn trees any time they feel like.
5. Trees under which traditional rituals were conducted were never cut down. With cultural change, nowadays rituals are never performed and trees are being cut indiscriminately.

Today because the changes are with us, the communities have developed coping strategies which are not necessarily directed to the healing and regeneration of the environment. These strategies are mainly survival tactics in the harsh environment they find themselves in. For instance they are: -

a). Using maize stalks and sugar cane scrapings as firewood
b). Using banana fibers to thatch instead of grass
c). Using bricks to build instead of poles.

How the changes have influenced the incidences of sleeping sickness and Nagana

The natural habitat of tsetse flies has been the forests and vegetation. With destruction of these habitats by human activities, tsetse flies have now adapted to bushes near the homes thus spreading disease to humans and livestock.

With habitat loss, wildlife which acted as the main source of blood meals for tsetse flies has migrated and the flies have changed hosts, feeding on humans and livestock instead.

Loss of forest cover has resulted in destruction of river catchment areas and therefore drying up of rivers and springs which used to be the source of water for communities. Now the communities have to rely on water from the swamps for domestic use and livestock. This has therefore exposed the women, children and livestock to undue tsetse challenge.

FITCA activities and how they are likely to impact on the forests, woodlands and vegetation in the short and long term period

The activities being carried out by FITCA include: -

1. Deployment of tsetse traps
2. Spraying of livestock to control tsetse and ticks
3. Sensitization of communities
4. Provision of oxen and ox – plough

The benefits of trapping tsetse and spraying are: -

a) In the short term, healthier livestock and in the long term, increase in livestock numbers which may have negative impact on environment causing soil erosion due to overgrazing if carrying capacities are not adhered to
b). Reduction in cases of sleeping sickness

Sensitization of the communities should not only be focused on control of sleeping sickness and Nagana but also in developing and adopting technologies that will mitigate the negative long term impacts on the environment.

Provision of oxen and ox-plough will result in more land being put under cultivation thus more food for the households in the immediate future thus increasing food security and sufficiency. Equally this may result in reduction in forest and woodland cover as more land is put under cultivation, unless these measures are accompanied by adoption of better farming methods that result in soil and water conservation at farm level.

Recommendations

In order to move to a healthier forest, woodlands and vegetation environment, the communities made the following recommendations: -

Table 3. Recommendations on how to mitigate changes in forest, Woodlands and vegetation by four communities in Eastern, Uganda

Change	Recommendations
Deforestation	1. Sensitize communities on the importance of trees and negative impacts of deforestation 2. Encourage and train communities on agro forestry 3. Encourage use of energy saving jikos 4. Establishment of woodlots for fuel and tree nurseries. 5. Prohibit bush burning. 6. Communities develop by laws to protect forests
Soil infertility	1. Control soil erosion by strip farming 2. Encourage use of organic manure 3. Use of plant residue as manure 4. Adopt contour ploughing

	5. Sensitization of communities on causes of infertility in soils
Overgrazing	1. Develop improved pasture 2. Keep fewer animals 3. Practice zero grazing
Drying up of springs	1. Protect water catchment areas.

Indicators to assess successful adoption of the recommendations

Table 4.Indicators for measuring the level of success in adopting suggested recommendations in forest, woodlands and vegetation

Soroti	Tororo	Iganga	Kamuli
Deforestation 1. Availability and accessibility of timber and firewood 2.Less damage from wind *Soil fertility* 1. Increased yields from crops due to improved soil fertility	*Deforestation* 1.increased area under forest/ tree cover 2.increased availability and accessibility of firewood 3. increases number of plant species 4. Number of wood plots established 5. increased number and species of wildlife sighted 6. number of households using energy saving jikos *Rainfall* 1.amounts and duration of rainfall received *Soil fertility* 1. Increased yields *Alternative sources of income* 1.Number of groups formed and engaged in income generating activities	*Deforestation* 1.Number of established woodlots at household levels *Soil fertility* 1.Number of households adopted modern farming methods 2. Amounts and variety of yields from crops	The group did not give indicators of successful adoption of recommendations on forests and vegetation but on tsetse control in general.

Observations

Deforestation is a threat to people's livelihood options, contributing to habitat loss, soil and wind erosion, and general land degradation. For communities such as these who are virtually dependent on fuel wood for energy needs, deforestation also has a social and economic cost. The perception of the impacts of deforestation as drawn by the community in Tororo (Figure 2) does prove that they are conscious of the effects of deforestation.

Wild food plays an important role in food security for the rural people. Habitat loss through deforestation denies these communities the source of livelihood. In Kenya, Barnett (1997) reported that in Kitui district, bush meat consumption is a daily, weekly, or monthly activity for most people and represents the bulk of all meat protein consumed by the inhabitants, with domestic meat playing a reduced role in meeting protein requirements. The communities in Tororo and Soroti regarded bush meat as one of the products they obtain from forests and vegetations. Loss of this source of protein will deny them an alternative source of protein to meet the protein demand and may result in protein deficiencies.

Rural and urban communities across Africa depend largely on medicinal plants collected from the wild, for their health needs. All the four communities recognized the role of forests, woodlands and vegetation as meeting this need. This is mainly due to unaffordable western conventional medicines. Unsustainable activities may foreclose such livelihood options making more and more people vulnerable, due to subversion and destruction of indigenous coping strategies.

The communities in the four locations are aware of the dangers associated with wanton destruction of the forests, woodlands and vegetation gauging from the ease with which they conducted the discussions. They are already experiencing the negative effects of those actions.

How the changes impact on human livelihood

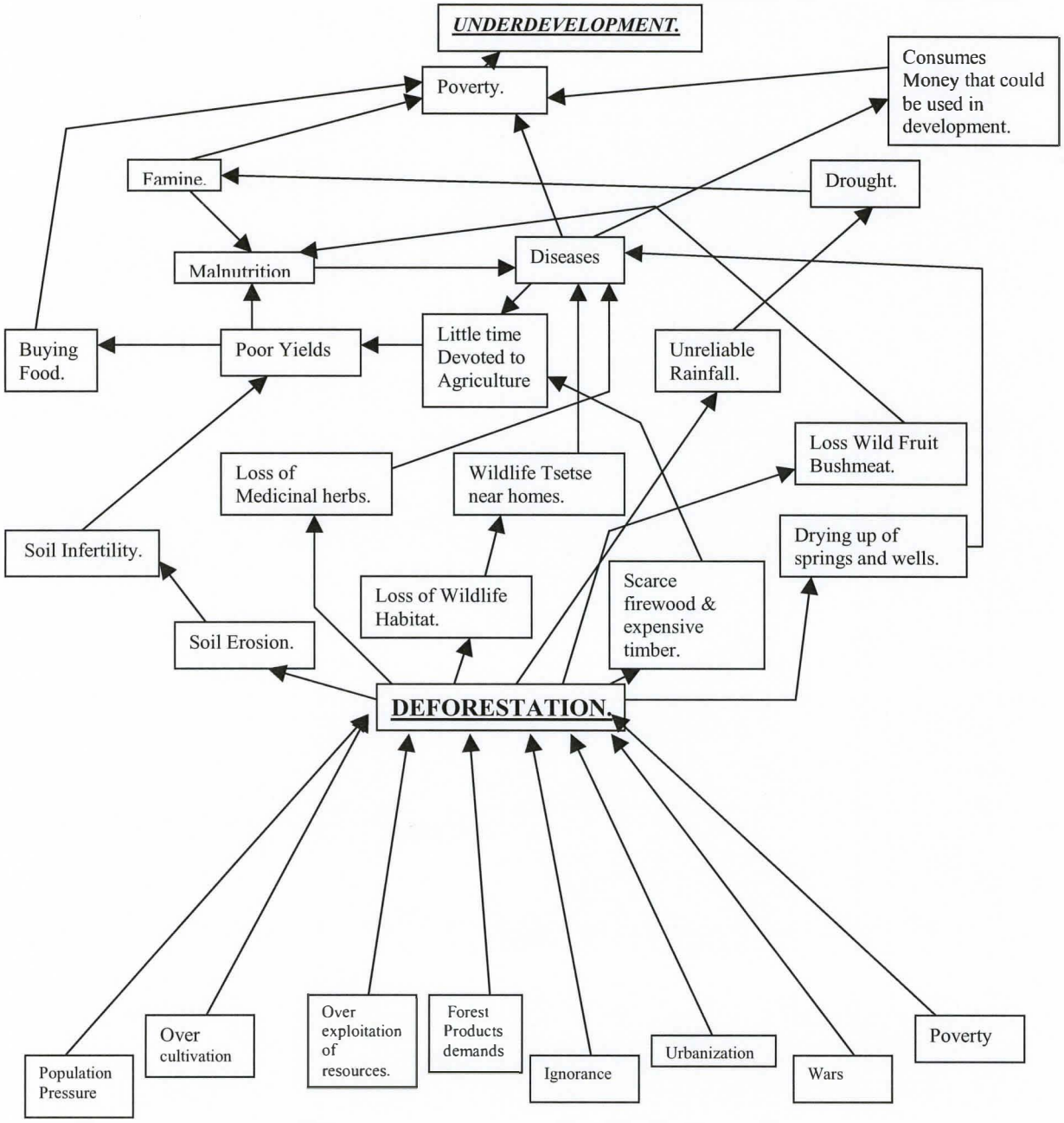

Figure 2: The perception of the causes and consequences of deforestation by communities in Iloywa, Sub County, Tororo.

WETLANDS AND WATER

Definition

All the four communities gave varying but complimentary definitions of their perception and understanding of the terms wetlands and water. Where a definition was difficult to come up with, they described the uses or qualities of wetlands and water.

Wetlands were defined as a place that has water always, water logged, with fertile black soil, where papyrus, Napier and elephant grass and thorny bushes grows. Wetlands are suited for growing cabbages, tomatoes, rice and sugarcanes.

Water was difficult to define but they believe it is the life sustaining commodity, and is found in rivers, lakes, springs, wells, boreholes and wetlands. It is used for drinking, washing, watering animals and irrigating crops.

Goods and services obtained from wetlands and water

Goods

Soroti
Fish
Grass for thatching
Papyrus for making mats
Clay for making pots
Sand quarrying
Grazing area during dry periods

Tororo
Fish
Papyrus for mats
Worms for using as fishing baits
Clay for making pots
Sand for building
Grazing area during dry periods

Iganga
Papyrus for making mats
Clay for making pots
Fish for food and selling
Making bricks
Sand for building
Palm trees for fencing and leaves for mats
Grass for thatching

Kamuli
Papyrus for making baskets and mats
Clay for making pots
Fish
Making bricks
Sand for building
Firewood

The four communities had similar goods and products they harvest from wetlands. In Soroti and Tororo wetlands are used as alternative grazing lands during the dry periods. livestock keeping is a major economic activity for these communities. In Iganga and Kamuli, where human population is higher and there are no open tracts of lands for

grazing livestock like in Soroti and Tororo. Wetlands are a major source of fish for all the communities.

Table5: Perception of services offered by wetlands and water by the four Communities in Eastern Uganda

Soroti	Tororo	Iganga	Kamuli
1.Helps in the hydrological cycle 2. Temperature regulation 3. Water storage 4. Purifies water 5. Flood control 6. Transportation 7. Employment 8. Recreation (swimming) 9. Irrigation 10. Power 11. Fish farming	1.Habitat for wildlife 2. Growing rice, coco yams and sugarcane 3. Controls floods 4. Purifies water 5.Helps in the hydrological cycle	1.Provides water 2.Growing of rice and vegetables 3. Hiding place for thieves 4. Helps in the hydrological cycle 5. Habitat for wild life 6. Sink for waste disposal 7. Transport 8. Power production 9. Transport 10. Employment (fishing, sand)	1. Growing rice, vegetables 2. Habitat for wildlife 3. Helps in hydrological cycle 4. Ameliorates temperature 5. Grazing land 6. Tourism

Changes that have occurred in Wetlands and Water in the last 30 years

Table 6: Changes that have occurred in wetlands and water in the last thirty years

Change	Causes
Drying up of Wetlands [a]	1. Population pressure leading to wetland cultivation 2. Deforestation 3. Draughts causing evaporation 4. Overgrazing 5. Building in wetlands 6. Siltation due to poor farming methods

	7. Poor fishing techniques of draining water to get fish 8. Increased number of boreholes
Cultivation in Wetlands [a & b]	1.Better fertile soils in Wetlands guaranteeing good yields 2. Population pressure 3. Income from bricks and sand harvesting 4. Climatic changes leading to increase in irrigation 5. Ability to grow crops all year round
Reduction in grazing areas [a]	1. Cultivation of wetlands 2. Population pressure encroaching on dry grazing lands
Settlement in wetlands [a & b]	1. Ignorance 2. Overpopulation 3. Construction of commercial buildings especially near towns
Cutting of trees around wetlands [a & b]	1. Income from timber and charcoal 2. Clearing wetlands for planting rice and vegetables 3. Household firewood
Increase in protected springs, boreholes and household sanitation [b]	1. Sensitization on dangers of unsafe water 2. Improved technology for bore hole drilling 3. Donor funds drilling boreholes 4. High water table and can dig shallow wells 5. Donor projects requiring latrines at households before drilling bore holes
Disappearance of wildlife [a & b]	1. Over harvesting (hunting / fishing) 2. Habitat loss 3. Cultivation of wetlands
Flooding [a]	1. Over cultivation 2. Heavy rains causing Lake Kyoga to over flow its banks
Reduction in soil fertility in wetlands [a]	1. Burning of wetlands 2. Overgrazing 3. Over cultivation without furrow periods
Fish farming in Kyere [b]	1. Income generation

[a] changes with negative effects
[b] Changes with positive effects

How the changes have affected incidences of sleeping sickness and Nagana

The changes listed by the four communities in the study sites have had some significant effects on sleeping sickness and Nagana incidences. Drying up of wetlands leading to decreasing sizes, settlement in wetlands and cultivation have lead to habitat loss for tsetse forcing them to move to thickets and bushes of *Lantana camara* species near homesteads thus increasing the chances of tsetse bites and therefore increase in sleeping sickness and Nagana cases.

Loss of habitat in the wetlands has forced wildlife to migrate which are the preferred source of blood meals by tsetse, thus forcing them to seek alternative hosts in humans and livestock resulting in diseases.

Flooding of wetlands is associated with more fish and as fishing activities increase, it exposes humans to fly challenge. Flooding also tends to increase the fly numbers as environmental conditions are optimum for hatching of the pupae.

Lack of firewood as trees are cut in wetlands results in women looking for firewood in L*antana camara* bushes where tsetse have found new habitat after destruction of wetland habitat. This exposes them to tsetse bites increasing chances of contacting sleeping sickness.

The impact of the changes on livelihoods

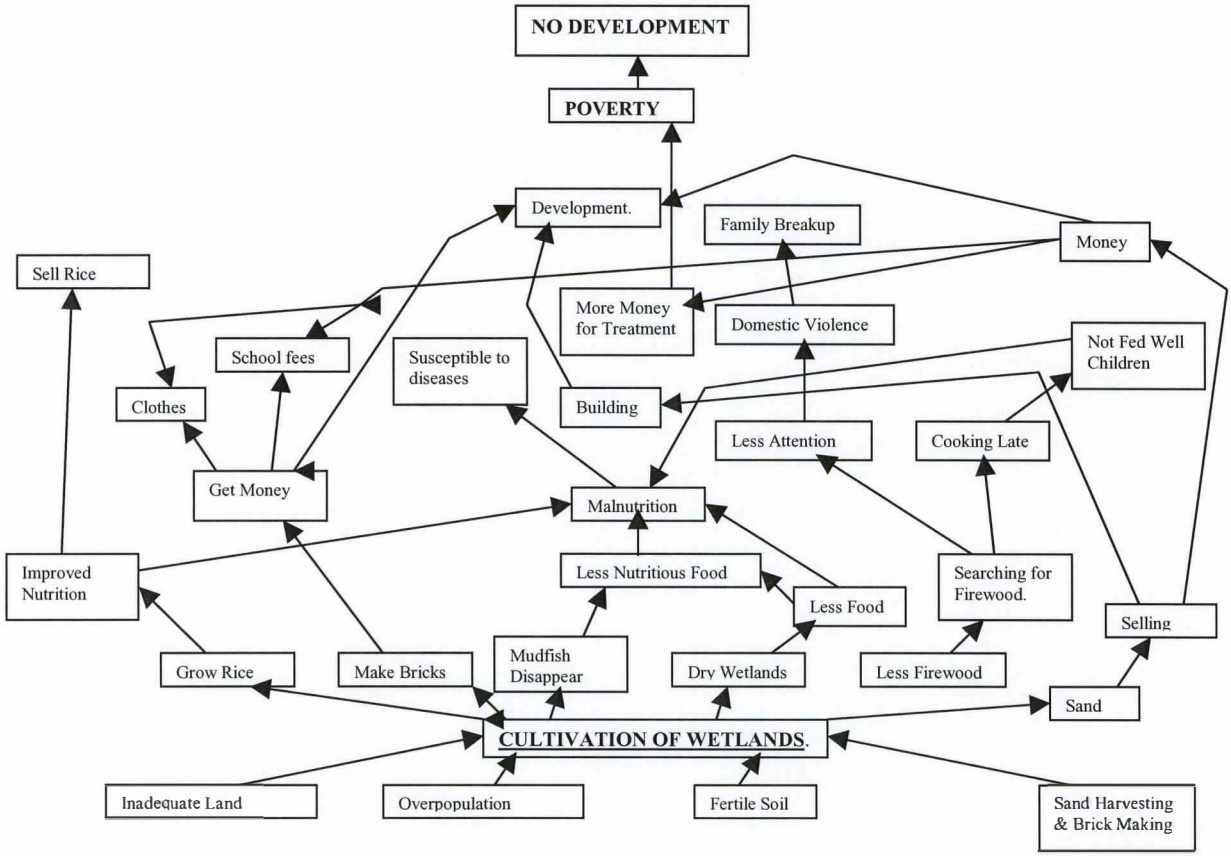

Figure 3 The perception of the causes and consequences of cultivation in wetlands by communities in Namwendwa Sub County, Kamuli District.

Indigenous knowledge used long ago to mitigate the impact of changes in wetlands and water

The communities did not cultivate on all wetlands. There was selection of the wetlands to be used for cultivation while others were preserved. The preservation was necessary for cultural rain making rituals. The decision by elders on which wetland to be protected was respected by all. It is not like today where such wisdom is questioned and decisions flouted with impunity.

Collection of water for domestic use and watering of animals were done at specific points which were regarded as having low risk of tsetse challenge.

Cultivation was only done in upland areas because the soils were still fertile. Since the wetlands were the habitat for wildlife, fear of dangerous wildlife prevented such cultivation to be done. Cultivation in selected wetland areas was done once a year thus allowing land to furrow and provide habitat for wildlife and recover from soil nutrients loss.

Activities such as brick making, sand harvesting and charcoal burning were not taking place in the wetlands as we have today. The commercialization of these goods has lead to wetland destruction. Tree cutting was restricted as only particular trees designated by the elders would be harvested. These made some areas sacred and therefore were conserved.

Some clans never killed animals (Murwa clan in Iloywa, Tororo). This meant wildlife existed harmoniously with human and livestock.

Overpopulation which has resulted in encroachment of wetlands was not a problem then. The age at which marriage took place was set by the community in order to have mature responsible members in the society. Today there is no cultural norm for the age of marrying. This coupled with low childhood mortalities has resulted in high population growth. Traditional birth control methods were respected. A woman could not have a baby until the older one was walking and not suckling. Today a woman would be suckling a baby and carrying another in the womb. Promiscuity was culturally prohibited and virginity was a virtue honored and appreciated.

There was a belief that wetlands were the home of ancestral spirits and therefore needed to be preserved. Culture prohibited going into such areas. Today such beliefs are not respected and no place is out of bounds for any one. Christianization and subversion of such strategies have led to the destruction of these valuable natural assets.

How FITCA activities are likely to impact on wetlands and water in the short and long term period

The communities listed the following as FITCA activities in their areas.

1. Deployment of traps
2. Provision of foot pumps, acaricide, ox- plough and oxen
3. Sensitization of communities on good farming methods and tsetse control
4. Vaccination of local poultry
5. Introduction of zero grazing
6. Pasture development

These activities are not in all study sites. In Soroti for instance, the community have no idea about zero grazing, provision of foot pump, acaricide, oxen, ox-plough and pasture development. It appears that these are being promoted in Tororo, Iganga and Kamuli.

Deployment of tsetse traps

In the short term, traps will reduce fly population resulting in fewer cases of sleeping sickness and Nagana. This will translate into healthier animals and people. Selling of animals and animal products will bring the much needed income and therefore alleviate poverty.

In the long term, reduction in fly population resulting in healthier animals might lead to overstocking and resultant overgrazing of uplands and wetlands. Equally, this will lead to reclamation of wetlands from fly infestation and cause over cultivation of wetlands.

Provision of foot pumps and acaricide

These will lead to reduced cases of Nagana and other tick borne diseases. The effect is healthier animals and more income for the communities in the short term. In order to get more income, the tendency will be to increase livestock population and possibilities of overstocking and overgrazing leading to land degradation exist.

Insecticide if not properly disposed could drain into water masses causing death of marine and fresh water species. Insecticides are not target specific and would kill other non target species and therefore have detrimental long term ecological considerations.

Introduction of zero grazing

This will have beneficial short and long term effects. The practice will result in reduced livestock populations, less land degradation and better breeds with higher production. If adopted widely in tsetse reclaimed areas, zero grazing will reduce the tendency of overstocking and overgrazing which eventually leads to land degradation. It will cause regeneration of wetlands because of reduced grazing pressure and reoccupation of wetlands by wildlife.

Provision of oxen and ox-plough

The communities will cultivate more land hence more food. This will result in household food security and selling surpluses to increase and supplement household incomes. The long term effect is poverty alleviation a desired goal for sustained development. If the provision of the implements is not coupled with sensitization of the communities on better farming methods, this can easily lead to soil erosion and silting of the wetlands.

Sensitization of communities on better tsetse control
The current approach is to clear *Lantana camara* bushes which are habitat for tsetse. This will definitely have the effect of reducing tsetse populations. If the areas cleared of the *Lantana camara* bushes are not replanted with other species to offer ground cover, this will make the soils vulnerable to wind and water erosion causing siltation of wetlands.

Recommendations

Cultivation in wetlands

1. Develop rice variety capable of growing in upland areas
2. Community to formulate regulations governing sustainable use of wetlands. Wetlands are a common good and should be preserved for all.
3. Construct earth dams at parish level for use in growing vegetables

Reducing wetlands size

1. Community to demarcate the areas for agricultural and grazing activity
2. Stop agricultural activities in areas where the wetlands are reducing in size

Disappearance of wildlife from wetlands

1. Stop over cultivation of wetlands
2. Restrict hunting to enable the existing species to build up on numbers
3. Afforestation to rehabilitate the habitat
4. Wildlife translocation to restock wetlands with appropriate species
5. Sustainable harvesting using appropriate technologies that will not deplete stocks. Community to establish hunting seasons and quotas.
6. Establish aquaculture.

Flooding

1. Establish draining channels and establish soil conservation techniques to prevent gully formation

Reduction of grazing area

1. Stop cultivation of wetlands
2. Reduce the size of livestock herds
3. Practice zero grazing

4. Prohibit settlements in wetlands
5. Establish improved pastures

Infertile soils

1. Sensitization on the use of cheap methods of improving soil fertility e.g. application of organic manure
2. Afforestation to prevent wind and water erosion
3. Practice furrowing

Indicators to assess the successful adoption of the recommendations

Cultivation in wetlands

1. Improvement in wetlands flora
2. Increase in wetlands sizes
3. No agricultural activities taking place in wetlands
4. Increase in number of earth dams in parishes

Reduced wetlands sizes

1. Number of wetlands that have increased in size
2. Reduced number of dried up swamps
3. Increased amounts of fish and fish species from wetlands

Disappearance of wild life from wetlands

1. Increase in number and species of wildlife sighted

Reduction in grazing areas

1. Fat and healthy livestock
2. More animal products
3. Improved health and lifestyle of communities
4. More grazing lands

Infertile soils

1. Healthier crops
2. Higher yields

Observations

Wetlands are an important source of livelihood for communities in this part of the country. It is imperative that conservation efforts be made at village level in order to continue benefiting from the goods and services provided by the wetlands and water.

The communities however, did not appreciate the gravity of freshwater and ground water pollution problem and its impacts on human health and industrial development in water intensive industries and tourism. Equally the role of draught in affecting water quality as drop in water levels in dams and rivers result in concentration of sewage, agricultural agro-chemicals thus resulting in disease outbreaks and adversely affecting fresh water and marine ecosystems. Whereas communities saw changes in wetlands size as a danger to their livelihoods, it was not clearly associated with draughts. Only in Tororo did communities associate inadequate rainfall with decreasing wetland size. This is understandable as Uganda is well endowed with well distributed and reliable rainfall in comparison to other East African states.

Although the government has enacted laws that help conserve the wetlands and water sources, where these fall on individual lands, prohibiting individual utilization of the resource because it is a common good without alternative compensation options will not lead to enhanced conservation of these resources. The question of utilization of the resource and the legislative measures in place to conserve these areas generated heated arguments which, revealed that communities were not opposed to the conservation efforts but needed incentives in order to conserve wetlands in private lands against the pressure to utilize them and provide for the increasing population demands.

LIVESTOCK AND WILDLIFE

Definition

The communities' defined livestock as domesticated animals while wildlife as non domesticated species. With examples in each category they showed their understanding of the differences between the two.

Goods and services provided by livestock and wildlife

Goods /Services

The four communities described the same goods and services offered by livestock and wildlife.

Goods

Livestock	*Wildlife*
1. Milk	1. Meat
2. Meat	2. Skins
3. Cow dung for building	3. Medicines (Hippo and Fox meat treatment for measles
4. Manure	4. Honey
5. Hides and skins	
6. Butter/cow ghee	
7. Eggs	
8. Income	
9. Chicken feed (crushed bones)	
10. Honey	
11. Wool	
12. Blood	

Services

Livestock	*Wildlife*
1. Draught power	1.Income
2. Transportation of goods (bulls/donkeys)	2. Medicinal
3. Hunting (dogs)	3. Pollination and seed dispersal
4. Security (dogs)	4. Control of rodents and snakes
5. Control of rodents (cats)	5. Recreation
6. Income	
7. Medicinal (fats from animals)	
8. Payment of dowry	
9. Cultural rites (used in cultural rituals)	
10. Some birds indicate time and seasons.	
11. Nutrition	

Changes that have occurred in Livestock and Wildlife in the last thirty years

Table 7: Changes that have occurred in livestock and wildlife in the last thirty years

Changes	Causes
Livestock	
Reduction in Livestock numbers [a & b]	1. Insurgency 2. Cattle rustling 3. Diseases like Nagana, ECF, new castle and Coccidiosis 4. Selling to meet household requirements 5. UPE has lead to fewer hands for looking after animals 6. Traditional pastoralists who used to be employed sought better paying jobs
Increase in Livestock diseases [a]	1. Increase in tsetse flies 2. Restocking with susceptible breeds 3. Cattle rustling 4. Grazing in wetlands which are tsetse infested 5. Increase in acaricide resistant ticks 6. Poor feeding
Reduction in grazing land [a]	1. Population pressure
Decrease in Livestock diseases [b]	1. Awareness 2. Bush clearing to reduce tsetse habitat 3. Use of traps and spraying (Nagana and ECF) 4. Easy access to drugs and veterinary extension services 5. Increased incomes and ability to afford treatment 6. Community control efforts (cattle crutches) 7. Government interventions 8. Improved feed supplements
Reduction in animal sizes [a]	1. Inbreeding 2. Poor pastures
Easy access to markets [b]	1. Increased population stimulating demand for animal products 2. Good infrastructure 3. Political stability
Keeping of improved breeds [b]	1. Sensitization and awareness of their value 2. Shortage of land due to population pressure

	3. Adoption of modern farming techniques 4. Need for increased incomes
Reduced watering points [a]	1. Encroachment of wetlands by human activity
Better farming methods [b]	1. Awareness 2. Access to drugs 3. Availability of water at households by government and NGO programmes
Wildlife	
Reduction in wildlife numbers and numbers seen [a & b]	1. Wars 2. Poaching and smuggling of endangered species 3. Hunting for bushmeat 4. Habitat destruction 5. Wildlife diseases 6. Hunted out because they are danger to people
Changes in wildlife habitat [a &b]	1. Clearing forests for crop cultivation 2. Over harvesting forests for timber and other wood products
Reduction in seasonal migratory birds [a]	1. Changes in weather 2. Hunting them for food
Increase in types of domesticated birds [b]	1. Alternative source of protein 2. Aesthetics at households.

[a] Changes with negative effects
[b] Changes with positive effects

In Soroti and Tororo, the communities did not mention reduction in animal diseases as a change. However, in Kamuli and Iganga this was seen as a great change with beneficial results. This is possibly a reflection of better extension and veterinary services as one nears the capital or the influence of FITCA (Uganda) activities. While Iganga and Kamuli political stability was seen as contributing to easy market access, in Soroti, wars and cattle rustling had the opposite effect in reducing livestock numbers, increasing animal diseases and causing poverty.

Reduction in livestock numbers had more negative effects than positive. The positive effects were, less numbers means less soil erosion, more grass for the few that remain. Dowry is reduced and many men now can afford to marry (before one required 30 cows now 2 are acceptable). Few animals also mean less conflict between animals and crop agriculture.

Less numbers have lead to high prices of animal products making them unaffordable by the majority, thus contributing to less protein intake and malnutrition in the vulnerable groups.

Loss of goods and services provided by wildlife is the major negative effect while reduction in wildlife numbers has caused less wildlife human and livestock conflicts.

The impacts of the changes on human livelihood

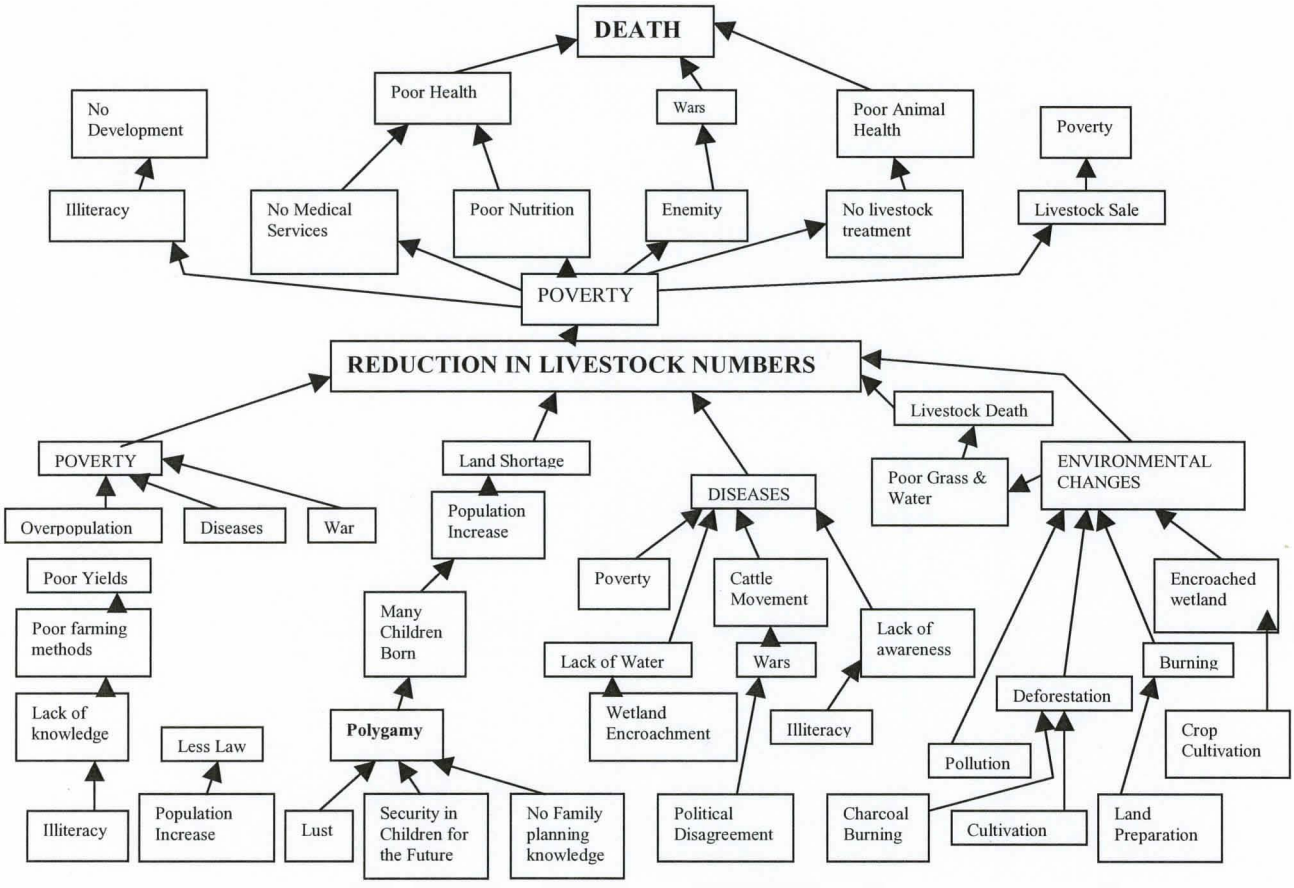

Figure 4: The perception of the causes and consequences of reduction in livestock numbers by communities in Bulamagi Sub County in Iganga district.

How the changes have affected incidences of sleeping sickness and Nagana

Disappearance or reduction in wildlife numbers has helped to reduce the incidences of sleeping sickness and Nagana because wildlife act as sources of reservoirs of the trypanosomes that the tsetse pick while feeding and transmit them to humans.

Screening and treatment of animals has helped reduce the disease in livestock and therefore disease in humans. Healthy animals translate into better prices for animal and animal products, making it easy for the farmers to afford basic human necessities.

Less grazing land has forced people to migrate elsewhere or keep smaller herds and therefore less income from sale of livestock and livestock products. Alternative land uses has reduced the habitat for tsetse and therefore fewer cases of sleeping sickness and Nagana.

Introduction of zero grazing has meant animals being stall fed and less likely to contract the disease because of lack of exposure to conditions predisposing animals to tsetse challenge.

Provision of drinking water for animals at homes has reduced the likelihood of tsetse challenge during watering at the swamps for both livestock and herders thus reducing incidences of Nagana and sleeping sickness.

Indigenous knowledge used long ago to mitigate the changes in livestock and wildlife

The communities use herbs to treat animal diseases. Such herbs includes, "Ekorit" to treat ECF and "Ekoroi" to treat CBPP.

In order to chase away the tsetse flies, cow dung was burned in the kraals.

Kraals were strongly built to prevent attacks by wild animals. Lighting of fires in the Kraals at night helped to scare off wild animals.

ECF was treated by hot iron branding of the prescapular lymph nodes.

Witch doctors help was solicited so as to prepare charms to deter cattle thieves and rustlers.

Cattle breeding were done by careful selection of healthier and big bulls while the rest were castrated.

Hunting of wildlife was only for subsistence. This was done using bows and arrows or traps, therefore ensuring only few were caught.
Wildlife habitat was protected (See forests, woodland and vegetation).

How FITCA activities are likely to impact on livestock and wildlife in the short and long term period

FITCA activities include:

1. Deployment of traps to control tsetse flies
2. Clearing of *Lantana camara* bushes
3. Spraying of livestock
4. Pasture development
5. Introduction of Zero grazing
6. Provision of animal traction

Bush clearing will affect tsetse fly habitat thus reducing fly population and therefore lower incidences of Nagana. While this is a short term benefit, in the long term, if cleared areas are not seeded with replacement ground cover, wind and water erosion will affect the soil fertility. Excessive bush clearance will contribute to global climatic change affecting other ecosystems.

Deployment of traps will result in reduction in fly population and therefore reduction of sleeping sickness and Nagana. However, the communities cautioned the effectiveness of the traps if FITCA will not replace them after the insecticide used in impregnating traps lose its potency. In the event this happens, fly population may build up slowly to reach the present levels.

Spraying of animals will in the short and long term, reduce the fly and tick population if sustained. Draining of the run off dip water may have detrimental effects on soil microorganisms and also wetland and freshwater fauna.

Zero grazing will reduce overgrazing and formation of animal tracks that causes soil erosion and infertility. Manure from the units will be used to ameliorate soil fertility. Household incomes will increase from sales of livestock products from better higher yielding breeds of animals.

Pasture development will improve the nutrition of the animals thus improving their yields resulting in higher household incomes. Fields will be paddocked, thus limiting movement of animals from to tsetse infested areas, thus reducing the likelihood of contracting diseases. Contact with other animals from different herds will be minimized thus protecting them from contracting contagious diseases like CBPP.

Provision of animal traction will lead to cultivation of larger pieces of land allowing families to have more food thus improving on household food security. Equally this will result in reduction in vegetation cover as more land will be under cultivation. Since most of the land is under *Lantana camara,* reduction in this species will result in destruction of

tsetse habitat which will lead to fewer cases of Nagana therefore healthy animals and better returns from livestock investments.

Recommendation

1. Plant dual purpose trees to protect the environment and also offer other benefits like fuel to farmers.
2. Adopt zero grazing and pasture development to minimize overgrazing.
3. Encourage formation of environmental groups at village level to monitor and help manage the environment.

Indicators to assess the successful adoption of the recommendations

1. Number of trees planted at household level
2. Number of improved breeds of livestock kept.
3. Number of zero grazing units established
4. Number of environmental groups formed.

Observations

These communities have a high regard for cattle. When one talks about livestock they only think in terms of cattle. Other livestock species goats, sheep, poultry are of less significance. Any interventions that target improvement of cattle will have high adoption rates.

The indigenous knowledge that the communities have on ethno- veterinary medicine should be documented as it offers alternative affordable delivery of veterinary health services in areas where conventional services are not available.

Improvement of local breeds of cattle will form an important strategy for environmental conservation as this will mean reduced herd sizes and adoption of zero grazing units for higher yields and incomes. Development of artificial insemination services will certainly help in this transformation.

Land tenure system is crucial in control of livestock diseases and herd sizes. People will only keep the number of animals that their own parcels of land can take considering other land use patterns. Where there is no individual or group land ownership, this encourages keeping as many animals as one can amass as land for grazing is not limited. Individual land ownership restricts cattle movements and mixing of herds thus helping to control some of the contagious diseases.

THEME FOUR: LAND AND SOILS

Definition

The communities defined land as the solid part of the earth where they build, bury the dead, build houses and other natural resources like forests, wildlife, water and minerals. Soil is that part of the land which supports growth of crops and vegetation. There are different types of soils e.g. sandy, loam and clay soils.
Land comprises of different soil types and depending on ownership there is government, private and communal land holding tenure systems.

Goods and services provided by land and soils

1. Construction of houses
2. Source of medicines from the ecosystems it holds
3. Obtain water and minerals

Services obtained from land and soils

1. Transport system e.g. roads and railways are constructed on land as it offers solid support.
2. Construction of houses and materials for such construction are obtained from land e. g. bricks, stones, sand and poles.
3. Offers a medium where crops, trees and vegetation grows, thus supporting human and animals life.
4. Land is used as an asset; one can sell to get money and also cultivated to offer employment.

Changes that have occurred in land and soils in the last 30 years

1. Land fragmentation due to increase in population
2. Land degradation leading to poor soil fertility and low yields
3. Deforestation as more land is put up for agricultural use
4. More use of inorganic fertilizers to ameliorate soil fertility
5. Emergence of new weeds types and vegetation like *Lantana camara*
6. Erosion due to mans' activities like overgrazing and deforestation
7. Littering of land with polythene bags that are not degradable thus a sore to sight.
8. Cultivation of wetlands
9. Change in land tenure system
10. Better agricultural farming methods

Causes of the changes

Land fragmentation

1. Population increase

Land degradation

1. Overgrazing
2. Farming on the same soil every season without allowing land to furrow
3. Deforestation leading to soil erosion
4. Failure to use organic manure

Deforestation

1. High demand for wood fuel and other wood products
2. Establishment of new cultivated land for growing crops
3. Burning of vegetation and forests

Cultivation of wetlands

1. Planting of crops with better market value (tomatoes, rice and cabbages)
2. Wetlands have fertile soils
3. Increase in population therefore requiring more land for crop and animal husbandry

Change in land tenure system

1. Government policy for sustainable development

Better agricultural farming methods

1. Better extension services
2. Introduction of new varieties of crops and breeds of animals
3. Use of inputs such as fertilizers

How the changes have affected the incidences of Sleeping sickness and Nagana

With better infrastructure people can easily get to health centers for medical attention thus reducing mortalities due to sleeping sickness.

Deforestation and encroachment on wetlands modifies the tsetse habitat thus reducing their population and therefore fewer cases of sleeping sickness and Nagana

Deforestation and destruction of vegetation has resulted in emergence of new plant species like *Lantana camara* which has become a good habitat for tsetse. This has lead to increase in tsetse populations and increase in cases of sleeping sickness and Nagana.

Indigenous knowledge system used long ago to mitigate the changes in land and soil

Land furrowing was practiced. This used to allow the soils to regenerate the nutrients and resulted in higher yields. Mulching was done to afford nutrient recycling back into the soil. Crop rotation was another measure used to ensure nutrient replenishing for higher yields.

Tree cutting was controlled by local customs and beliefs

Inter cropping was widely practiced. This system ensured that there was food even in times of crop failure as not all planted crops would fail in any particular season.

Bands were maintained between plots to control run off and therefore soil erosion.

How FITCA activities are likely to affect land and soil in the short and long term period

FITCA activities

1. Sensitization of communities on clearing bushes around homesteads. This will cause a decrease in fly population therefore decrease in cases of Nagana and Sleeping sickness. If bushes like *Lantana Camara* are cleared and the land is not replanted with other appropriate bushes or vegetation, this will expose the land to wind and water erosion leading to infertile soils and poor yields. Sensitization will also result in communities being involved in environmental issues therefore better use and care of the environment at community level.

2. Provision of ox plough will result in more land under cultivation resulting in higher yields and therefore household food security.

3. Deployment of traps and spraying of animals are all targeted at reducing fly population and therefore decrease in cases of sleeping sickness and Nagana. When this is achieved, livestock numbers will increase resulting in increases of household incomes from sale of livestock and livestock products.

4. Introduction of zero grazing and exotic breeds of animals. The two activities will result in decreased pressure on available land being converted into grazing areas thus making land available for other agricultural enterprises. Organic manure from the zero grazing units will be used in the farms to improve soil fertility and ensure higher yields and better economic returns.

Recommendations

1. Communities should be encouraged to plant trees around their farms. This will bring about ground cover and protect the soils from water and wind erosion. In order for the communities to take up agro- forestry, there should be identification of tree species that are suited to each site and offering more benefits than only providing ground cover.

2. Adoption of better farming techniques.

1). Introduction of zero grazing units. These will help to reduce grazing pressure on land as well as providing the much needed manure for improving soil fertility in order to increase crop yields.

2). Communities should be encouraged to adopt better ploughing techniques such as contour and strip bands ploughing in order to arrest soil erosion at farm level.

3). Farmers should be encouraged to use organic manure to improve soil fertility instead of inorganic fertilizers. This will result in higher yields and more fertile soils.

4. Farmers should be encouraged to revert to inter -cropping and rotation of crops in order to increase yields, ensure household food security and maintain fertile soils.

3. Communities to form environmental groups at village level to spearhead environmental monitoring and protection activities. Seminars and workshops on environmental issues should be held with communities in order to raise awareness of the deteriorating situation of land and soils.

4. Village councils to adopt by laws that would promote environmental well being at the same time meet the needs of the community.

5. Land tenure system should offer the farmers certainty of ownership so that they can invest in land use patterns that improve the soil fertility.

6. Land subdivision results in uneconomical parcels that cannot meet the household food requirements leading to food insecurity and insufficiency promoting malnutrition and susceptibility to childhood diseases. The minimum economical land unit should be established in order to prevent land fragmentation.

Indicators to assess the successful adoption of the recommendations

1. Afforestation
    1) Number of tree nurseries established
    2). Number of trees planted by households
2. Better farming methods
    1). Number of zero grazing units established
    2). Number of improved breeds kept and by how many households
    3). Extent and number of households adopting soil conservation measures
    4). Yields per unit area of the planted crops signifying improved soil fertility.

3). Number of seminars held and participants trained.

4). Number of village councils who have enacted and implemented the by laws to protect environment.

5) Establishment of minimum land unit size that is economically viable to meets household needs.

OVERALL RECOMMENDATIONS

The communities made specific recommendations for each theme which are not necessarily site specific, but are generally applicable to all sites. In addressing each theme, the recommendations have more than one activity which the community can address in order to combat the environmental issue in question.

The communities in the four sub counties are aware of the consequences of their activities on the environment and how these impact on their livelihoods. However, this awareness is not translated into actions aimed at conserving the environment. FITCA-EMMC could supply the stimulus necessary to get the communities into action, because having started this engagement by involving the communities in discussing environmental issues, the communities have confidence in FITCA-EMMC and therefore, should see to it that the communities are on their way to conserving and using the natural resources in a sustainable manner.
This entails:-

1. Engaging communities at the village level to develop action plans aimed at environmental conservation.

   Formation of Natural Resource Management Committees (NRMC) at village level will be vital in order to oversee the implementation of the community developed actions plans. These committees would form the focus for establishing community by laws through village councils to safeguard, protect and sustainably use the natural resources at communities disposal in consultation with relevant governmental and non governmental agencies.

2. FITCA-EMMC may not have the financial and human resources to assist the communities in implementing action plans. It is for this reason therefore, that FITCA- EMMC needs to identify various national / regional/district stakeholders to collaborate with, in order to have an impact on environmental conservation now that communities have identified environmental issues as having great impact in their lives. This will equally help entrench the natural resource management in local population for the purpose of sustainability.

The cross cutting issues raised in each of the four themes by all the sites include:-

Afforestation/ agro-forestry

Habitat and biodiversity loss was cited as the main problem resulting from forests/woodlands degradation, drying up wetlands/springs and wells in the catchment areas. This increase soil erosion due to loss of ground cover and lead to disappearance of wildlife from wetlands and forest and woodlands.

In order to arrest these trends, afforestation and agro-forestry be practices can be encouraged at village and household level. This requires identification of appropriate tree species which are suitable for each area and are multipurpose to enable communities have greater economic and social returns from the venture.

Communities need to be encouraged to establish tree nurseries in order to have planting materials available locally for better adoption rates. At household level, the families should be encouraged to plant trees along land boundaries and also establish woodlots.

Utilization of wetlands/ water for agricultural purposes

Adverse weather, loss of soil fertility and increase in population were given as the main reasons for cultivation in wetlands. This has led to increase in wetlands utilization. The government has enacted laws that prohibit utilization of wetlands identified as serving common good. Such areas fall in privately owned lands and incentives needs to be given to encourage conservation amidst pressures to utilize these to provide for household needs.

Equally, efforts should be doubled to promote growing of upland rice varieties. Provision of earth dams to conserve rain water for irrigation and growing of vegetables will discourage cultivation of wetlands.

Community NRMC established at village level and the village councils should be enabled to manage and encourage sustainable use of wetlands in their jurisdiction. At the moment such authority is vested under the district environment office.

Land and soils

Land rights are highly complex and sensitive social and political issues. Of importance in Uganda is land tenure system which allow communities and individuals to access and own land. This confers responsibility of improving the soil fertility through investment on appropriate land use methods. Such guarantee of ownership help to address issues of soil conservation measures (terracing, strip and contour ploughing, agro- forestry), practices that ameliorate soil nutrients and better farming techniques (composting, zero-grazing, organic fertilizers application) which would have ripple effects in the other themes.

Livestock and wildlife

Livestock and wildlife depend on forests, woodlands and vegetation, wetlands and water and land and soils for survival. Recommendations proposed for these themes would have impact in addressing wildlife and livestock issues. However, there are specific recommendations for this theme.

It was evident from Soroti and Tororo that better extension and veterinary services would help educate the community and reduce livestock diseases. This is necessary if the livestock sector is to grow as an industry.

Adoption of better husbandry techniques like zero grazing, establishments of improved pastures, keeping of better breeds of cattle and reduction in livestock numbers would help to make the livestock sector important in improving household incomes and also addressing issues of land degradation.

Afforestation efforts would restore wildlife habitat but not necessarily the wildlife species and numbers that were originally there. Translocation and restocking of wetlands and forests with selected wildlife species, coupled with sustainable harvesting quotas will encourage communities to conserve and derive economic gains from wildlife.

Population increase was cited as contributing to wetland cultivation, deforestation and land degradation. It is important that control of population growth be addressed by the communities in an effort to adopt family planning techniques that are culturally and religious friendly in order to limit population increase and therefore reduce pressure on land, wetlands and water resources, forests, woodlands and vegetation.

REFERENCES

1. Barnett, R. (1997). Food for thought: The utilization of wild meat in Eastern and Southern Africa. Traffic East/ Southern Africa, Nairobi Kenya.

2. FAO/AGL (2000). Management of degraded soils in southern and eastern Africa.(MADS-SEA-network). Land and Plant Nutrition Management Service of thee FAO, Rome. http://www.fao.org/waicent/faoinfo/agricult/agl/agll/madsea/intro.htm

3. Matowanyika, J.Z.Z. (1999). Hearing the crabs cough: Perspectives and Emerging institutions for indigenous Knowledge systems in land resource management in Southern Africa. SADC-EMLS/IUCN, Maseru and Harare.

4. Olsen,J; Rodgers, A and Salahe,J, (1999). Woodland and tree resources on Public Land in Tanzania II: Sustainable Management at Local level. Paper prepared for a workhop on Off- forest tree resources, Arusha Tanzania, 12- 16 July, 1999

5. Shiklomanov, L.A.(1999). Water Resources: Modern Assessment and outlook for 21st century. Federal Service of Russia for hydrometeorology and Environmental Monitoring, State Hydrological Institute, St. Petersburg

6. UNEP (2000). Africa Environment Outlook; Past, Present and future Perspectives. Earthprint Limited, Hertfordshire, England.

7. World Conservation Monitoring Centre (WCMC) (2000). Global Biodiversity: Earth's Living resources in the 21st century. By Groombridge, B. and Jenkins,M. D., World Conservation Press, Cambridge

APPENDICES

APPENDIX 1: ITINERARY

3rd- 7th October 2003	Soroti
8th October 2003	Travelling to Tororo
9th October 2003	Uganda Independence Day
10th – 11th October 2003	Tororo
12th October 2003	Travel to Iganga
13th – 14th October 2003	Iganga
15th – 16th October 2003	Kamuli
17th October 2003	Travel to Nairobi

APPENDIX 2: FITCA – EMMC WORKSHOP PROGRAMME WITH COMMUNITIES

DAY ONE

9.00 – 9.30	Registration
9.30 – 9.45	Introduction
9.45 – 10.15	District Environmental Officer – Government's position on Environment.
10.15 – 10.45	Lecture- Bernard Toutain
10.45 – 11.00	Break
11.00 – 12.30	Plenary- Environment and Natural Resources
12.30 – 2.00	Lunch
2.00 – 5.00	Group Work (Woodland and Vegetation; Wetlands and Water; Land and Soil and Wildlife/ Livestock and others)
5.00	Departure

DAY TWO

9.00 – 10.00	Plenary Reporting and Discussion – Woodland / Vegetation
10.00 – 11.00	Plenary reporting and discussion – Wetlands / water
11.00 - 11.15	Break
11.15 – 12.15	Plenary reporting and discussion – Land / Soil
12.15 – 1.15	Plenary reporting and Discussion – Livestock / wildlife
1.15 – 2.00	Lunch
2.00 – 3.00	Conclusions / Recommendations
3.00	Closure Departure

APPENDIX 3: CHECK LIST OF QUESTIONS TO GUIDE THEME DISCUSSIONS

Plenary on Environment and Natural resources

Objective: Build consensus

What is environment?
What constitutes the environment?
List the components of the environment.
List the natural resources common in this area.
Which of these are useful and list those that are not directly useful but necessary for the society?

1. Working Group on Forests, Woodland and Vegetation.

List the products and services obtained or could be obtained by your community from woodlands and vegetation.
What are the changes that have taken place in the woodlands and vegetation over the last thirty years?
Which of these have positive or negative effects?
What were the causes of these changes and their impact on human livelihood?
How have these changes affected incidences of sleeping sickness and Nagana?
What indigenous knowledge systems were employed to mitigate these causes?
What changes are directly related to FITCA activities or are likely to be caused by FITCA activities?
Make recommendations to mitigate the negative changes indicated above.
How do we assess the impact of our interventions?

2. Working group on Wetlands and water

List the goods and services provided by wetlands and water to the communities.
What changes have taken place in wetlands and water in the last thirty years?
Which of these changes have had beneficial or detrimental effects?
What were the causes of these changes and how do they or have they impacted on human livelihoods?
How have these changes affected incidences of sleeping sickness and Nagana?
What indigenous knowledge systems were employed in the past to mitigate against these causes?
Which changes are directly related to FITCA activities or are likely to result from current FITCA activities?
Make recommendations to mitigate these negative causes of change witnessed or likely to occur in wetlands and water in the future.
How do we assess the impact of our interventions?

3. Working group on land and soil

What are the goods and services provided by land / soil?
What are the changes that have occurred in land and soil in the last thirty years?
Which of the changes have had positive or negative impacts?
What are the causes of these changes and have they or are they likely to impact on human livelihoods?
How have these changes affected incidences of sleeping sickness and Nagana?
What was the indigenous knowledge systems used to protect land /soil from these changes?
Which changes are likely to occur or have been caused by FITCA activities?
Make recommendations on how to mitigate against these changes that are likely to occur or have occurred in land and soil.
How do we assess the impact of our interventions?

4. Working Group on Livestock / Wildlife

List the goods and services provided by livestock / wildlife and insects to communities.
What changes have occurred in this component of the environment in the past thirty years?
Which have had positive or negative effect?
What caused these changes?
How have these changes affected human livelihoods?
How have these changes affected incidences of sleeping sickness and Nagana?
What was the indigenous knowledge systems used to protect livestock and wildlife from the changes witnessed?
Which changes are likely to occur or have occurred due to FITCA activities?
Make recommendations on how to mitigate these changes that are likely to occur and also how to renege those that have occurred?
How do we assess the impact of our interventions?

APPENDIX 4: LIST OF PARTICIPANTS

AKOROI, SOROTI DISTRICT

Alilimo Village

1. Osege,Abraham - LC1 Chairperson
2. Ekopiton, Simon Peter- Youth Leader
3. Odokel, Christopher- LC2
4. Eswagu, Stephen
5. Omakira, Christopher
6. Otekat, Max
7. Okodel, John Mike
8. Omule, Stephen
9. Amuriat, Peter
10. Akol, Petua- C/person Women
11. Apio, Margaret
12. Igonyu, Mary
13. Adie, Betty
14. Akutui, Esta
15. Aguti, Florence

Okodo Village

1. Okring, Stephen – LC1 C/Person
2. Inyoin, Charles
3. Ague, helln Rose
4. Okello, Joseph
5. Emuron, John
6. Osege, Samuel
7. Akonyet, William
8. Emwanyu, William
9. Acom, Christine
10. Akello, Rose
11. Atim, Angella
12. Alemura, Betty
13. Abungo, Betty
14. Alupo, Martha
15. Acom, Janet

Nananga B

1. Omiat, G.- LC1 C/person
2. Emitu, J.P.
3. Acada, G
4. Okia, R
5. Ogulei, J.R
6. Acada, R.- Youth Leader
7. Wabwire,J
8. Acaro,R
9. Amenya, J.M
10. Acengo,C
11. Asio, F
12. Odeke, M
13. Amuge
14. weigulo, A.
15. Acipa, H

Akoroi B

1. Ojimok, Lambert –LC1, C/person
2. Acen, Roda C/person Women
3. Ataget, Justine – Youth Leader
4. Ojok, Gerphers
5. Isamata, George William
6. Akunyo, Christine
7. Audo, Susan
8. Oreje, Levi
9. Arupo, Felly
10. Ononge, Kelement
11. Nankoma, Nuriat
12. Acam, Betty
13. Magino, Stephen
14. Akoti, Esther

15. Apolot, John korkas.

Akoroi A

1. Etoru, Joseph LC1, C/person
2. Adepo, Valentino
3. Amunya, Richard
4. Opolot, John Robert – Youth Leader
5. Ogwang, George William
6. Odeke, Gerefasio
7. Eribu, John
8. Epugau, Lumbert
9. Asado, Betty C/person women
10. Adie, Jennipher
11. Anuko, Hellen
12. Igemu, Margaret
13. Akoyede Ann Eguyu
14. Amulo, Hellen
15. Apeduno, Jannet

ILOYWA- TORORO DISTRICT

Nambogo B Village

1. Opendi, Anthony
2. Othieno, Pinoni
3. Owor, George
4. Oburu, Richard
5. Ongwen, Oketcho S
6. Opendi, Margaret
7. Okong'o, Florence
8. Owor Oboth, Bernard
9. Owor, Grace
10. Osinde, Isaac
11. Ofwono, Grace
12. Ochwo, Ayeko
13. Ayeka, Yerusa
14. Apollo, Ofwono
15. Okello, Disson

Papada Village

1. Opendi, Charles – C/person Nakimere
2. Owere, Janet
3. Owere, Paul Wafula
4. Atwan, frida Oketcho
5. Opendi, Edith
6. Okumu, pinon – LC1 C/Person
7. Nyapendi,Samali –Youth Leader
8. Omitta, John
9. Ofwono, G. Midumi
10. Odoi, Obongit Mary
11. Oketcho, Firikis
12. Odoi, Milton Obongit
13. Owori, Susan
14. Obelli, Moses
15. Odongo, Slivia

Mella-Pajabbo village

1. Ochwo, Charles
2. Oketcho, Winfrade
3. Opendi, Jeska
4. Osilo, Loyce
5. Olowo, Mary
6. Kasango, Margaret
7. Anyango, Grace
8. Osinde, Betty
9. Ochwo, Zadok
10. Othien, Chrisostome

11. Ofwono, Victory
12. Osabit, Charles
13. Oburu, Godfrey
14. Jagalo
15. Ochowo, Alowo

Kugeyi, village

1. Onyango, john
2. Ochani, James
3. Omima, Silver
4. Omalla, John
5. Onyango, Florence
6. Kafifi, Sam
7. Ofwono, Zaina
8. Okeya,Oketcho
9. Olaka, domonic
10. Onyango, Konsilta
11. Opio, Eridadi
12. Pchwo, Vitalis
13. Onyango, Vicent –LC1 C/person
14. Oketcho, Godfrey

Segere Village

1. Othieno, Emmanuel LC1 C/person
2. Oyo, james
3. Ochieng, Lawrence
4. Ochola, Yosam
5. Obbo, Anderia
6. Osuna, Richard
7. Ogwena, Joice
8. Oyo, James
9. Obuku, Lodia
10. Okoth, maliza
11. Nyafamba, Densi
12. Ofwono, Justien
13. Pajja, Edisa

Bulamagi-Iganga District

Bwanalira Village

1. Waluba, Stephen
2.Kafuko, Christine
3. Kafuko, Dorolance
4. Waiswa, Magidu
5. Mukalasi, Sarah
6. Bagaga, Stephen
7. Sajjabi, Daudi
8. Kauma, Kagere
9. Mogada, Christine
10. Namutamba, Florence
11. SSajjabi, David
12. Mpambiirp, Edinsa
13. Kaziba, Magidu
14. Buyinza, PATRICK
15. Mufungiza, Eriasa.

Bulowaza Village

1. Kairugavu, Ben
2. Abdu, Kirevu
3. Okumu, Z.K
4. Owino, John
5. Balibawa, Monic
6. Naikoba, Zabina
7. Walude, Christine
8. Tenywa, Chris
9. Kimera, Nasimu
10. Kabi, Paul
11. Madima, Wante
12. Nsubuga, Edinasi
13. Kabitanya, Christopher
14. Waiswa, Ezekiel

15. Magidu, Wante

Mawagala village

1. Nangobi, Mary
2. Biryeri, Monic
3. Mukyala, Harriet
4. Nalugonda, Monic
5. Nalubanga, Irine
6. Muwanika, Robina
7. Kyewalyanga, Fred
8. Wakyalo, George
9. Mwamadi, Mutale
10. Mutalwa, Yokoniya
11. Kyakulaga, Moses
12. Kigabane, Fred
13. Mulunda, Moses
14. Kaludu, Ali
15. Kidodo, john
16. Nangobi, Fatina

Bubaka village

1. Leeya, Nabongo
2. Kizamu, Mohammed
3. Makooma, Moses
4. Mukose, Ruth
5. Kintu, William
6. Batuka, Bearice
7. Namugo, Voyolla
8. Kawudha, Loyi
9. Kakire, Fred
10. Magumba, Lukiya
11. Kadaala, Patrick
12. Isabirye, Samuel
13. Kagere, Annani
14. Chansi, Osiah

Namwendwa - Kamuli District

Butaaga-Bukwanga villages

1. Bakoye Joseph
2. Isabirye, George
3. Tukone, Tomasi
4. Bafunhe, George
5. Mawerere, David
6. Ikomba, Zauja
7. Maaka, Robert
8. Lubogo, Charles
9. Mbaala, Charles
10. Buwande, Justine
11. Kalusi, Afuwa
12. Mitangu, Fred
13. Babirye, Tapppy
14. Nantambi, Rebecca
15. Nakiyemba, Edith
16. Linha, Hassan
17. nalubege, Jamira
18. Bumusekere, Patrick
19. Naigaga, jasca
20. Kitamirike, Bumali
21. Abasiga, Aida
22. Katende, George
23. Ngobi, Suman
24. Kitimirike, Sarah

Bugemye Village

1. Magamba, Mpata
2. Bamutala, Jojji
3. Bikufa, Egemesi
4. Talinakyo, Monika
5. Kigenda, Jojji
6. bagole, Lewo

7. Kitamelike, Samu
8. Singila, Swaibu
9. Faisi, Badilu
10. Oliva, Bwaita
11. Egemye, Ali
12. Kilwango, Williba
13. Kintu, Sitivini
14. Kaindi, Joni
15. Nabilye, Takaisa
16. Masabe, Kyalisi

Bukose – Bunyirwa villages

1. Bazira, Samuel
2. Luziba, Robert
3. Waibale, Charles
4. Mmondo, Possiano
5. Kirya, Abdul Karim
6. Kigozi, Benson
7. Bitu, Bagula
8. Kakaire, Ruth
9. Kabikaize, George
10. Kibumba, Jenifa

Bukooma village

1. Waiswa, George
2. Kaabi, Grace
3. Tibanywa, Patrick
4. Mwandu, Luusi
5. Nasirye, Edisa
6. Hamugaya, Pilisira
7. Tenywa, David
8. Nairuba, Robila
9. Aliwayoki, Tereza
10. Muwanika, Safani
11. Isabirye, Godfrey
12. Kakwla, Amuza
13. Waiswa, Peter

Buyuba-Busiri Villages

1. Saaba, Mutebe
2. Mawanda, Nathan
3. Kasimu, Walusa
4. Balyema, James
5. wanyama, Robert
6. Ngobi, Obadiya
7. Isabirye, Ali
8. Nadiopu, Yosiya
9. Nzimba, Carloline

Katono village

1. Muzale, Abudu
2. Kasiko, Badiru
3. Edish, Kyagaba
4. Mwibe, Dsimairi
5. Sumuni, Lugondha
6. Kadija, Mwase
7. Kadija, Mukwate
8. Mukoza, George
9. Rwekere, Elia
10. Yowasi, Tenywa
11. Nangobi, Prossicovia
12. Namusabi, Zaituna
13. Muuka, Franco
14. Bakamwise, Twaha
15. Dhomu, Shlati

Butogo Village

1. Balikitenda, Paul
2. Bagoole, Habibu
3. Kauma, Aissa
4. Kulaba, Kusaini
5. Kiwanuka, Charles
6. Bavute, Ruth
7. Ntigo, Kezekiya
8. Bireese, Moses
9. Kirodha, George
10. Mutagaya, Alamanzani
11. Abitiire, David
12. Abitiire, Catherine

Isingo village

1. Ojamwiira, Moses
2. Dhabangi, Wilson
3. Kibumba, James
4. Irana, Beth
5. Mukwaya, Beatrice
6. Kimanya, Paul
7. Bikumbi, James
8. Muzusa, Sharon
9. Idhweege, Paddy
10. Waiswa, Paul
11. Dhamba, Sarah
12. Balidhawa, Amis
13. Mirabu, Waiswa